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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/808,018	03/15/2001	David Nister	040000-710	4578

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EXAMINER
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SEALEY, LANCE W

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 09/12/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/808,018	<b>Applicant(s)</b> NISTER ET AL.	
	<b>Examiner</b> Lance W. Sealey	<b>Art Unit</b> 2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-12 and 15-28 is/are rejected.
- 7) ☒ Claim(s) 4, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 5.                      6) ☐ Other:

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## DETAILED ACTION

### *Allowable Subject Matter*

1. Claims 4, 13 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
2. The following is a statement of reasons for the indication of allowable subject matter:  
  
With respect to all three claims, no prior art anticipates or suggests, in a method for preprocessing a video sequence, identifying a frame as redundant if the motion estimation yields a final correlation coefficient above a predetermined threshold.

### *Claim Rejections -35 USC § 102*

3. The following is a quotation of 35 U.S.C. 102(b) and (e) which form the basis for all novelty-related rejections set forth in this Office action:

A person shall be entitled to a patent unless—

- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or sale in this country, more than one year prior to the date of application for patent in the United States; or
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by applicant for patent.

4. Claims 1-4, 7-8, 20 and 25 are rejected under 35 U.S.C. § 102(b) as being unpatentable over Wolf, "Key Frame Selection by Motion Analysis".
5. Wolf, in disclosing a method for identifying key frames in shots from video programs,

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also discloses, with respect to claims 1 and 20, a method for preprocessing a video sequence, the method comprising the steps of: receiving the video sequence ("1. Introduction", third paragraph, p.1228; either the camera or the Radius Studio-equipped Mac (see p.1229) can be the video sequence store and storage medium; it is inherent that the Radius Studio-equipped Mac would have a memory device); and generating a set of views suitable for algorithmic processing by performing frame decimation on the video sequence (Abstract, p.1228--frame decimation consists of eliminating frames which do not summarize the shot. The frame decimation is carried out on an SGI Indigo-2 workstation; see "3 Results", first paragraph, p.1229. Also, it is inherent that the frame decimation process could be considered preprocessing because "preprocess" is defined by the Merriam Webster's Collegiate Dictionary ("Webster's") as "to do preliminary processing of (as data)", and frame decimation is accomplished before the Wolf algorithm is performed).

6. Concerning claims 2 and 25, Wolf discloses the frame decimation comprising the steps of identifying redundant frames in the video sequence and deleting any frames which are identified as redundant ("redundant" is defined by Webster's as "exceeding what is needed or necessary; superfluous". Based on this definition, frames which do not summarize the shot are redundant—Abstract, p.1228).

7. Regarding claim 3, Wolf discloses the step of identifying redundant frames in the video sequence comprising the steps of: calculating whether a frame is essential for connectivity of the video sequence ("essential" is defined by Webster's as "belonging to the very nature of a thing

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and therefore being incapable of removal without destroying the thing itself"; "connectivity" is defined by Webster's as "the quality or state of being joined or linked together". The Wolf paper describes a new algorithm that selects several key frames from a single complex shot which effectively summarize the shot. (Abstract, p.1228). Therefore, frames which are "essential for connectivity" are frames which are needed to effectively summarize the shot. See "3 Results", second paragraph, last two sentences, p.1229—Wolf is concerned with connecting the key frames which are essential for summarizing a sight gag in the movie "The Mask".); and identifying the frame as redundant when the frame is determined not to be essential for connectivity of the video sequence ("3 Results", second paragraph, p.1229; the rest of the movie "The Mask"—the frames not concerned with communicating the sight gag—are inherently deemed to be redundant).

8. With respect to claim 7, Wolf discloses determining shot boundaries of the video sequence ("2 The Algorithm", first sentence); dividing the video sequence into at least one subsequence of frames, wherein each of the at least one subsequence of frames corresponds to a particular shot in the video sequence ("1. Introduction", fourth paragraph, second sentence); identifying redundant frames in the at least one subsequence of frames and deleting from the at least one subsequence of frames any frames which are identified as redundant (Abstract, p.1228).

9. Finally, concerning claim 8, Wolf discloses the shot boundaries provided by the camera which captured the video sequence ("3 Results", last paragraph, first two sentences, p.1230).

10. Accordingly, in view of the foregoing, claims 1-4, 7-8, 20-23 and 25 are anticipated under

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35 U.S.C. 102(b) by Wolf.

11. Claims 16-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Shimizu et al. ("Shimizu", U.S. Pat. No. 6,512,537).

12. Shimizu, in disclosing a motion detection method, also discloses a method for processing a video sequence to produce a set of views suitable for Structure from Motion processing, the method comprising the steps of:

- receiving a frame (col.1, ll.39-40);
- comparing the frame with at least one previously received frame (col.1, ll.39-41); and
- storing the received frame in a storage device when the comparison indicates that a difference between the frame and the at least one previously received frame is greater than a predetermined amount (col.1, ll.44-46, ll.23-25).

13. With respect to claim 17, Shimizu discloses the difference as indicating a motion between the at least one previously received frame and the received frame (col.1, ll.44-46).

14. Concerning claim 18, Shimizu discloses the frame received from a video capture device in real-time (surveillance camera; col.1, ll.39-40).

15. Regarding claim 19, Shimizu discloses the frame is received from a storage medium (inherent that a surveillance camera would have a storage medium, even if it is only to store film containing images).

16. Accordingly, in view of the foregoing, claims 16-19 are anticipated under 35 U.S.C. 102(b) by Shimizu.

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***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 5-6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of Lee et al. ("Lee", U.S. Pat. No. 6,400,831).

19. Concerning both claims, Wolf does not disclose global or local motion estimation. However, Lee discloses both global and local motion estimation at col.3, ll.44-46.

20. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Wolf method of key frame selection with the Lee method of motion estimation. This would facilitate identification of whether a frame is relevant by tracking an object through a video sequence (Lee, col.3, ll.44-56).

21. Accordingly, in view of the foregoing, claims 5-6 are rendered unpatentable under 35 U.S.C. 103(a) by Wolf and Lee.

22. Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of

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Ratakonda (U.S. Pat. No. 5,995,095).

23. With respect to claim 9, Wolf does not disclose determining shot boundaries by correlating adjacent frames in the video sequence after global motion compensation and identifying, for each pair of adjacent frames, the second frame in the pair as a beginning of a new shot based on the correlation between the frames in the pair. However, these elements are inherently disclosed by the Ratakonda method for hierarchical summarization and browsing of digital video at col.6, ll.60-62 because if  $K=1$ , that means there is a one-to-one correspondence between shots and keyframes, and the next (adjacent) shot indicates the next frame.

24. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Wolf and Ratakonda algorithms for identifying keyframes. This would facilitate an effective way of visual interactive presentation of a video summary to a user (Ratakonda, col.3, ll.54-56).

25. Accordingly, in view of the foregoing, claim 9 has been rendered unpatentable under 35 U.S.C. 103(a) by Wolf and Ratakonda.

26. Claims 10-12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of Fukunaga et al. ("Fukunaga", U.S. Pat. No. 6,282,240).

27. With respect to claim 10, Wolf does not explicitly disclose a video sequence received from a video capture device in real-time. However, this element is disclosed by the Fukunaga picture coder/picture decoder/transmission system (moving-picture input unit 101, FIG.1, and col.4, ll.23-25).



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28. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Wolf algorithm for identifying keyframes with the Fukunaga method of transmitting frames. This would facilitate a way to transmit pictures efficiently (Fukunaga, col.2, ll.55-56).

29. The other claims in this rejection will now be considered. Concerning claim 11, Fukunaga discloses receiving video from a video capture device as a sequence of frames (moving-picture input unit **101**, FIG.1, and col.4, ll.23-25) and Wolf discloses determining, for each frame in the sequence, whether or not to accept the frame (Abstract, p.1228); and storing the accepted frames in a storage device (inherent in "1 Introduction", first paragraph, sixth sentence).

30. Regarding claim 12, Wolf discloses using the steps of determining whether or not the frame is redundant, and accepting the frame if it is determined not to be redundant, in determining whether or not to accept a frame from the sequence of frames (Abstract, p.1228-- frames which do not summarize the shot are redundant).

31. Accordingly, in view of the foregoing, claims 10-12 have been rendered unpatentable under 35 U.S.C. 103(a) by Wolf and Fukunaga.

32. Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of Fukunaga and further in view of the Goodman article "Ready for action: five video-capture boards that bring motion video to your PC" ("Goodman").

33. With respect to claim 15, neither Wolf nor Fukunaga disclose monitoring the rate at

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which accepted frames are provided to the storage device; and providing an indication to the user of the video capture device to decrease the motion of the camera, if the storage device is unable to process the accepted frames at the current rate. However, these elements are disclosed by the section of the Goodman article concerned with making AVI movies (see "Frame Rates and Window Sizes", second paragraph, p.9).

34. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to combine the Goodman method of monitoring the rate at which accepted frames are provided to the storage device with the Wolf-Fukunaga frame manipulation method. This would avoid time wasted in assembling video files that the storage cannot accommodate (Goodman, "Frame Rates and Window Sizes", second paragraph, first sentence, p.9).

35. Accordingly, in view of the foregoing, claim 15 has been rendered unpatentable under 35 U.S.C. 103(a) by Wolf, Fukunaga and Goodman.

36. Claims 21-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of Apple Computer Inc.'s Apple Macintosh Family Hardware Reference ("the Macintosh hardware reference").

37. With respect to claim 21, Wolf (or, more specifically, the Radius Studio-equipped Mac mentioned in "3. Results", first paragraph, p.1229) does not explicitly disclose a data buffer. This is disclosed by the Macintosh hardware reference at the paragraph labeled "Data bus" on p. 1-11.

38. Therefore, it would be obvious to one of ordinary skill in the art at the time this invention

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was made for the Wolf Radius Studio-equipped Mac to feature a data buffer. The data buffer gives the Video Shift register direct access to the RAM in order to provide data to the video and sound circuits ("Data bus" paragraph, p. 1-11).

39. The other claims in this rejection will now be considered. Concerning claim 22, Wolf discloses a video capture device (the camera in "1. Introduction", third paragraph, p.1228).

40. Finally, regarding claim 23, Wolf discloses a memory device (inherent in the Radius Studio-equipped Mac, p.1229).

41. Accordingly, in view of the foregoing, claims 21-23 has been rendered unpatentable under 35 U.S.C. 103(a) by Wolf and the Macintosh hardware reference.

42. Claim 24 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf in view of Wikipedia, the Free Encyclopedia ("Wikipedia").

43. Wolf does not explicitly disclose flash memory. But Wikipedia's description of flash memory states that NOR flash memory was invented by Intel in 1988.

44. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate flash memory into the Wolf frame manipulation method. Flash memory is suitable for storage of program code that needs to be infrequently updated, such as the program code in digital cameras.

45. Accordingly, in view of the foregoing, claim 24 has been rendered unpatentable under 35 U.S.C. 103(a) by Wolf and Wikipedia.

46. Finally, claims 26-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over

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Wolf in view of Shimizu.

47. With respect to claim 26, Wolf discloses the elements of claim 20, the claim on which claim 26 depends. However, Shimizu discloses receiving a frame (col.1, ll.39-40); comparing the frame with at least one previously received frame (col.1, ll.39-41); and storing the received frame in a storage device when the comparison indicates that a difference between the frame and the at least one previously received frame is greater than a predetermined amount (col.1, ll.44-46, ll.23-25).

48. Therefore, it would have been obvious to one of ordinary skill in the art at the time this invention was made to incorporate the Shimizu ability to compare two frames into the Wolf frame manipulation method. This would aid Wolf in more quickly detecting a redundant frame because it helps Wolf to eliminate frames in which trivially small changes occur (Shimizu, col.1, ll.46-48).

49. The other claims in this rejection will now be considered. With respect to both claims 27 and 28, Shimizu discloses a sequence of frames received from a video capture device in real-time (surveillance camera; col.1, ll.39-40).

50. Therefore, in view of the foregoing, claims 26-28 have been rendered unpatentable under 35 U.S.C. 103(a) by Wolf and Shimizu.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the Office should be directed to the examiner, Lance Sealey, whose telephone number is (703) 305-0026.

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He can be reached Monday-Friday from 7:00 am to 3:30 pm EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

**Any response to this action should be mailed to:**

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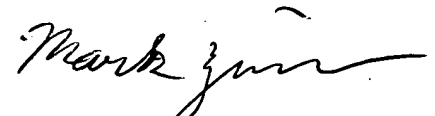
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**or faxed to:**

**(703) 872-9314 (for Technology Center 2600 only)**

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive,  
Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding  
should be directed to the Technology Center 2600 Customer Service Office at (703) 306-0377.



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